SFK consulting

Commercial-in-Confidence
Report No. 21179/R01
August 2023

DOWER HOUSE, HIGH STREET, HARLINGTON

STRUCTURAL ENGINEERING APPRAISAL

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C O N T E N T S

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Appendix B Drawings

1. INTRODUCTION

1.1 Purpose of Report

SFK Consulting is appointed as Structural Engineer to advise Komfort Services Ltd (the property owner) on the repairs and alterations necessary to bring the Dower House building back into reuse as a residential property.

Inspections of the property took place on 23rd February 2023 and 23rd June 2023 which the photos used in this report have been taken.

1.2 Building Description

The Dower House is listed grade II and suffered a significant fire in May 2011. Since then the property has stood vacant and derelict. In 2018, a temporary scaffold frame roof was erected over the building, but no repairs have been undertaken following the fire in 2011.

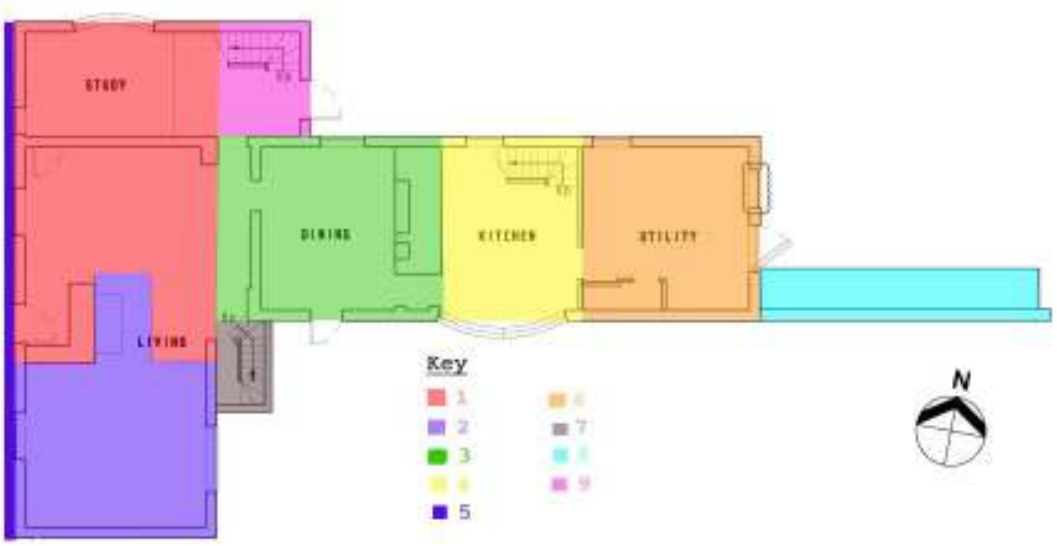

Figure 1.1 - Phase Plan, showing the nine distinguishable phases of development of the building. This excludes the alterations made in 1967, including the bay windows to kitchen and study and the adjacent freestanding garage.

A historic building survey has been carried out by Compass Archaeology.

Listing Description

The below is taken from the listing entry on the Historic England website.

Two-storey house with C18 brick front to an older timber-framed structure, with large rebuilt C16 chimney. The house is four bays wide, built of brown brick with red brick quoins and window dressings. The building suffered severe fire damage in May 2011. In May 2018 the Council took enforcement action to ensure that the building was made wind and weathertight, and it has a temporary roof. The house was sold in 2020 and initial pre-application discussions have taken place with the Council regarding its repair and future uses.

Site Details

Designated Site Name:	THE DOWER HOUSE
Heritage Category:	Listed Building grade II
List Entry Number:	1080196
Local Planning Authority:	Hillingdon
Site Type:	Domestic > Residential building

Location

Building Name:	The Dower House
Street Number:	393
Street Name:	High Street
Locality:	Harlington
County:	Greater London
District / Borough:	Hillingdon
Parliamentary Constituency:	Hayes and Harlington
Region:	London and South East

Assessment Information

Assessment Type:	Building or structure
Condition:	Very bad
Occupancy / Use:	Vacant/not in use
Priority:	A - Immediate risk of further rapid deterioration or loss of fabric; no solution agreed.
Previous Priority:	A
Ownership:	Private

2. INSPECTION FINDINGS

2.1 Roof

The roof has been split into different areas reflecting ~~on~~ their different nature and level of damage, shown in Figure 2.1.

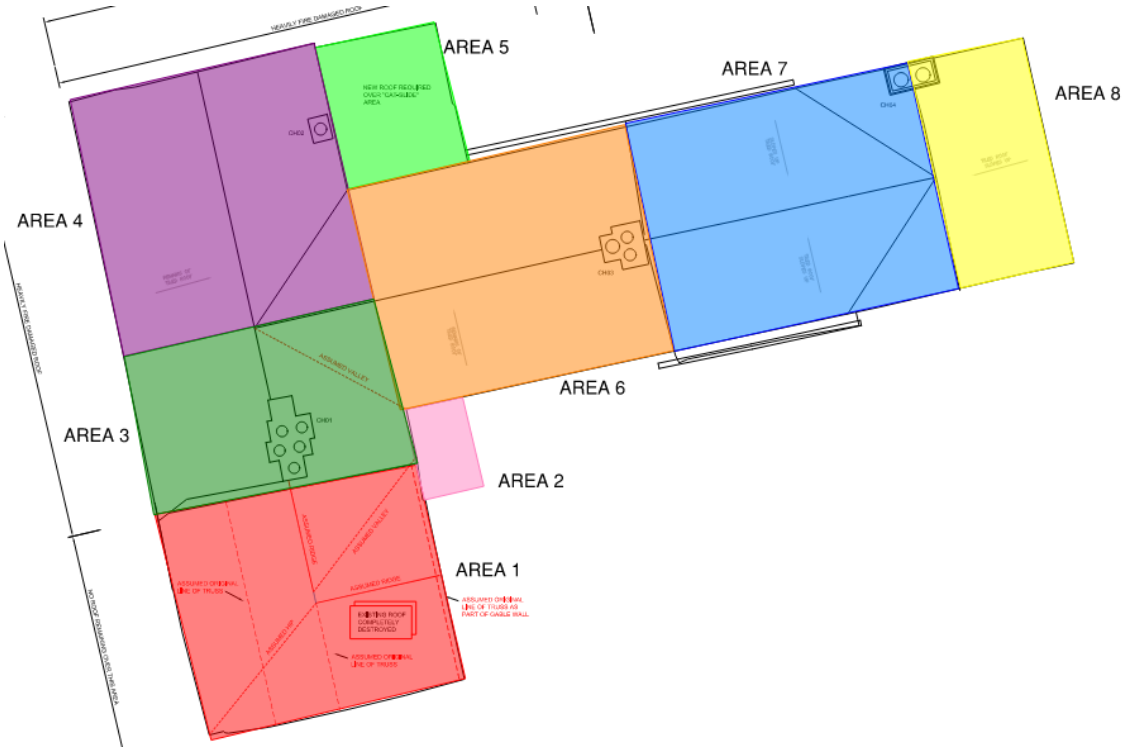

Figure 2.1 - Roof plan split into reference areas

2.1.1 Area 1

Area 1 was an addition to the original building, but still in a style that is sympathetic to the form and materials of the original building construction. The fire has completely destroyed the roof in this area. Only a few timber wall plates remain, however these wall plates indicate that a significant structural failure occurred pre fire. The wall plates that have failed are at the top of the walls to the southern and the western elevations, the walls in these areas also required rebuilding.

Figure 2.2 - Roof area 1 with roof structure having collapsed

This area will require new structure in the form of green oak queen post trusses in a similar manner to the survived existing trusses in areas 3 and 4.

2.1.2 Area 2

Area 2 is a flat roof and looks to have survived any significant structural damage as a result of the fire, however the roof covers a modern addition to accommodate a staircase. This modern masonry addition displays major structural defects and is to be carefully taken down and rebuilt, with the new roof to be softwood joists/rafters.

2.1.3 Area 3

Area 3 was a later addition to the original roof but follows the same principles and form of the roof to the original building, with evidence of a junction around the chimney stack. The top part of the rafters to the queen post truss to the north of the stack requires replacing by means of splicing. This approach will preserve the maximum amount of

historic timber. It is recommended to use 3 year air dried seasoned oak for this with a hidden stainless steel splice plate.

The purlin to the east side of the chimney requires replacing and the strut which supports it to the west side of the chimney assessed for suitability after charring is removed.

The queen post truss to the north of chimney needs to have its support to the east bearing assessed. The survey allowed for limited access and visibility to this, so needs to be investigated when possible.

All common jack rafters require replacing with new rafters. It is recommended to replace these with similarly sized treated softwood rafters.

Figure 2.3 - Roof Area 3 looking south east

2.1.4 Area 4

Area 4 of the roof is part of the original house and has been seriously impacted by the fire. Most of the lower ceiling members, truss ties and struts to the trusses and purlins show evidence of charring, however these have not been structurally undermined, so have the potential to be retained. However, the top parts of the queen post truss will require replacing. due to extensive damage. A similar approach to area 3 is recommended in order to preserve historic fabric.

The queen post truss to the north gable is in very poor condition and the external render has detached from the frame. The entire gable in this location needs replacing, due to extensive fire damage to the vertical timber studs. Replacement of the structure could be achieved through a timber framed gable as opposed to a replacement truss, which may make detailing of the wall more straightforward (weathertightness and insulation).

As with Area 3, the eastern bearing to the roof truss would need further investigation as the survey provided limited access and visibility.

Figure 2.4 - Roof Area 4 looking north

2.1.5 Area 5

Area 5 is another later addition to the original house and had a catslide roof which has partially collapsed due to the fire, whilst the majority of the surviving structural members display significant fire damage and would need to be replaced. Softwood common rafters would be a suitable replacement.

Figure 2.5 - Roof Area 5

2.1.6 Area 6

Roof area 6 is part of the latterly extended eastern wing and has been heavily impacted by the fire. The roof structure in this area was timber queen post trusses in a similar arrangement to the original house, but of lower quality than area 4. This area has sustained more damage than area 4 and will require complete replacement as a result of the fire damage. There is however sufficient evidence remaining to remake the primary structure on a like for like basis using green oak for trusses and purlins and treated softwood for common rafters.

Figure 2.6 - Roof Area 6

2.1.7 Area 7

The surveys did not allow for internal access to this area of the roof, however external inspection was possible. From what could be seen, this area of the roof displays no~~t~~ signs of fire damage from a structural perspective nor of any obvious structural damage or failure. It is anticipated that there will be a level of repairs required in this area once it has been inspected, so allowances must be made for some rafter replacements, rafter end replacements and valley replacement.

The masonry gable wall between roof areas 6 and 7 is mostly intact following the fire event, but local repairs may be required after further investigation and the wall should be repointed using NHL 3.5 lime mortar.

Figure 2.7 - The external view of roof area 7

2.1.8 Area 8

As is the case for area 7, there was no internal access to the roof for area 8. Whilst externally it shows little evidence of fire damage, it does show signs of structural failure as a result of insufficient lateral restraint from the wall to the thrust at the base of the rafters.

Figure 2.8 - Roof area 8 from the east elevation

2.1.9 Chimneys

All of the brickwork chimneys remain in reasonable condition and do not appear to pose any concerns from a structural perspective, with any damage appearing to be localised and should be repaired accordingly. The brickwork to the chimney should be repointed using NHL 3.5 lime mortar, with the top 4 courses rebuilt with NHL 5 lime mortar. Repointing above roof level will be required.

Figure 2.9 - Southernmost Chimney

2.2 Elevations

2.2.1 Western Elevation

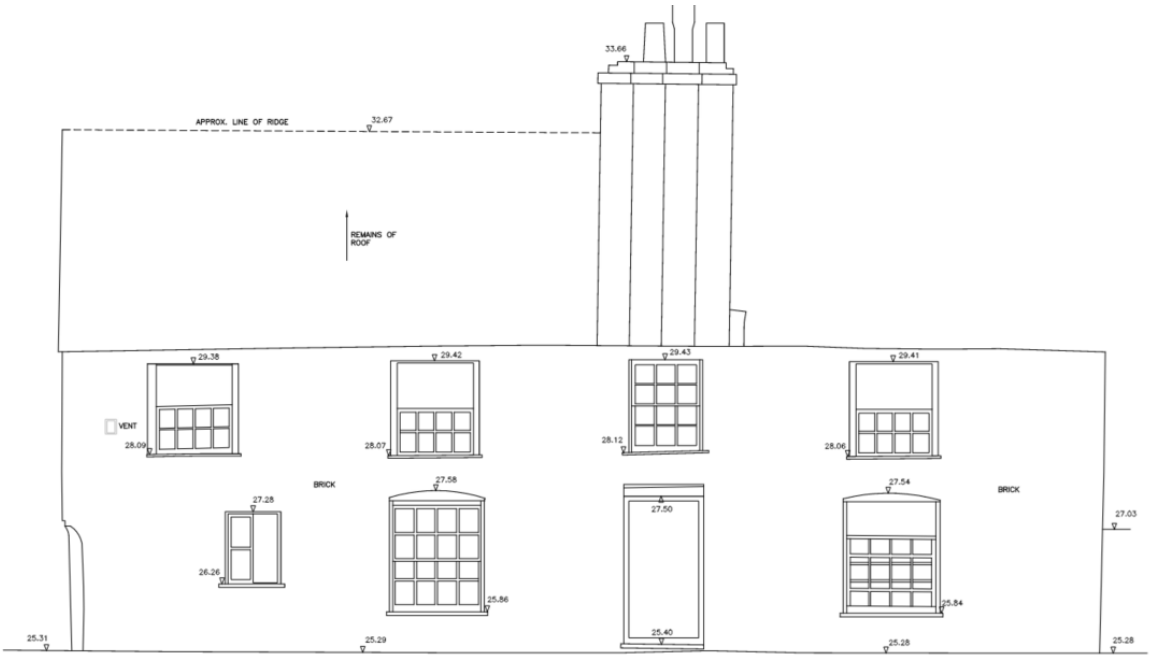

Figure 2.10 - Western Elevation

The western elevation forms the main entrance elevation to the property and shows evidence of various items of structural damage and failures that would require interventions, these are detailed below.

The southern part of the elevation, where the roof has collapsed, in leaning out significantly due to long standing lateral thrust that predates the fire.. This extends from the southern wall to the main entrance doorway and encompasses the area above this doorway. This failure has to be resolved by the rebuilding of this portion of the wall. This rebuild may also include the replacement of the footings if found to be insufficient when exposed.

Figure 2.11 - Portion of the Western Wall demonstrating lean present

There are areas of the masonry on the elevation that require repointing in lime mortar which will be identified on any repair layouts, see Figure 2.12.

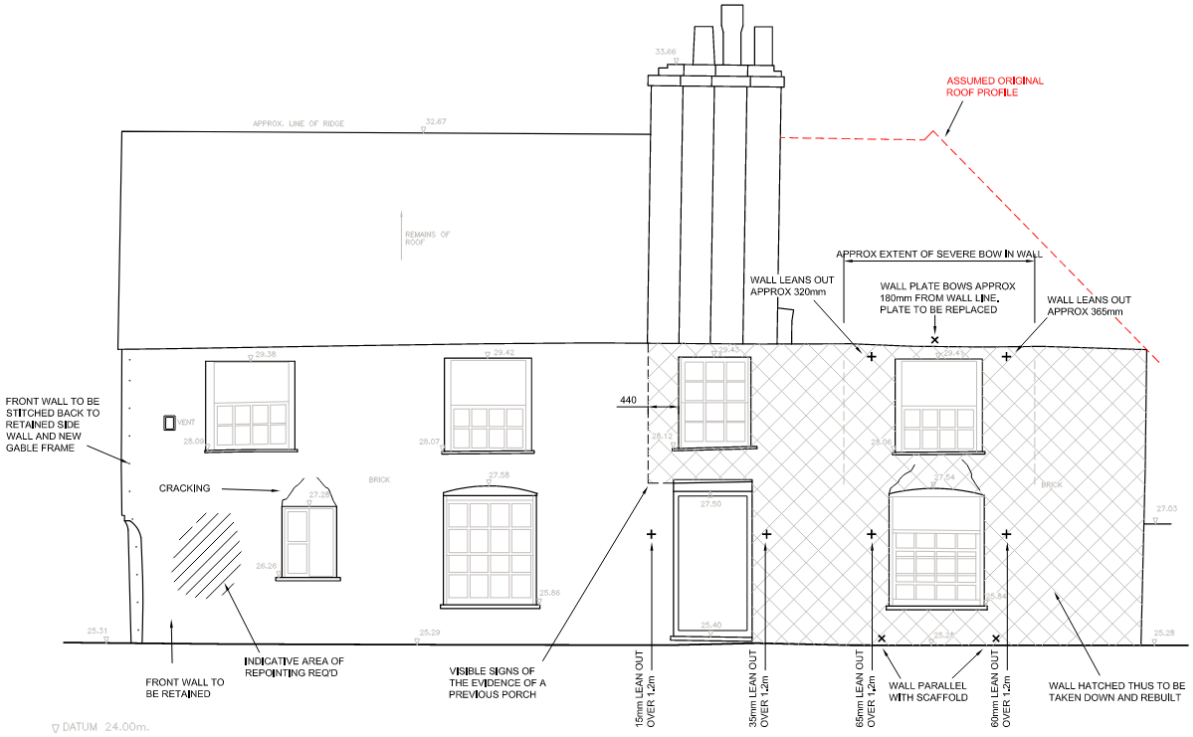

Figure 2.12 - Overview of findings and repairs to the western elevation

2.2.2 Northen Elevation

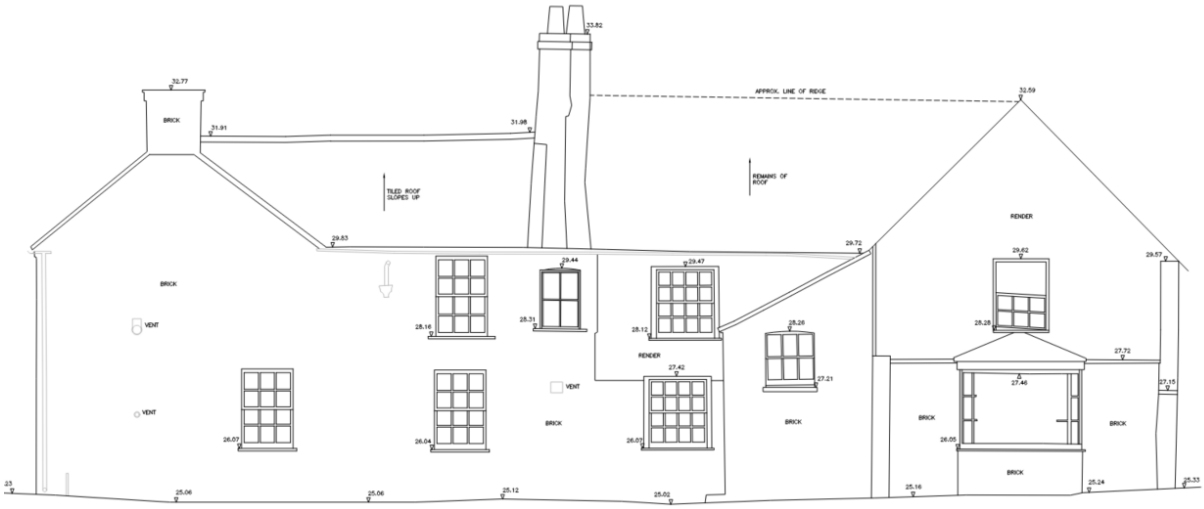

Figure 2.13 - Northern elevation

The first part of the northern elevation is part of the original building and is showing various signs of damage that require intervention. The first of these is cracking at the corner to the western elevation, where the return is separating from the elevation. This is

required to be stitched back into the northern elevation from the ground up to eaves level. This can be achieved through the use of sock anchors approximately 1.0m long.

Figure 2.14 - The crack to the north west corner

The western portion of the wall at first floor and roof levels is constructed in a timber frame with an external pebbledash render, however this has exhibited damage to the point of needing replacement. The first floor and gable is fire damaged beyond repair and should be rebuilt in timber frame, also allowing for modern insulation to be incorporated for future habitation. The same applies to the portion of wall to the rear of the later extension at first floor level, see Figure 2.17.

Figure 2.15 - The Northern Gable

The eastern part of the elevation is showing signs of water damage owing to damaged/missing guttering and downpipes. This requires replacement to ensure no further damage to the external masonry, see Figure 2.16, the brickwork will also require consolidation with local replacement and repointing.

Figure 2.16 - Water damage to the northern external wall

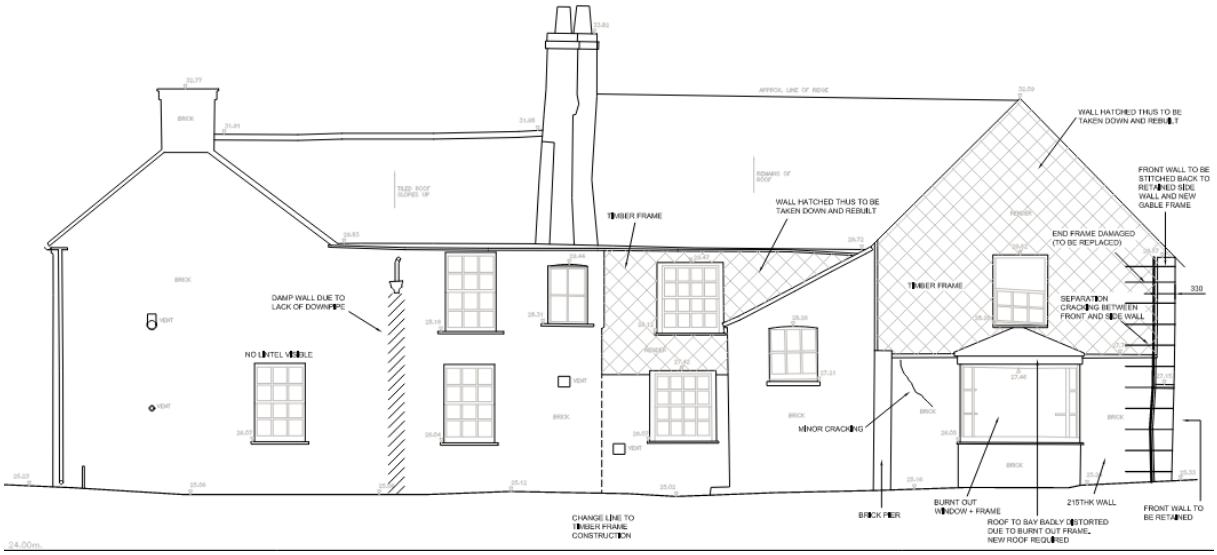

Figure 2.17 - The northern elevation identifying findings and repairs

2.2.3 Eastern Elevation

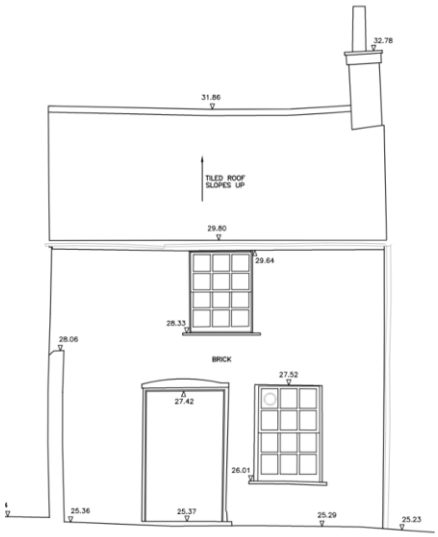

Figure 2.18 - Eastern Elevation

The eastern elevation shows significant bowing out at the eaves level owing to the roof spread above (see 2.1.8). This wall requires tying into the first floor structure to help laterally restrain the wall and ties within the roof/ceiling structure. The nature of this repair is unclear currently as the area was inaccessible during the inspections, so further investigation is required.

There is also an area to the southern side of the first floor window showing some cracking in the masonry where it looks as though some infill has been applied to accommodate a smaller window (Figure 2.19) than what would have been the original. This area of brickwork requires to be rebuilt and stitched in to the adjacent masonry.

Figure 2.19 - The first floor of the western elevation

The southern corner has a number of cracks between the ground and first floor where the return requires strengthening, this should be achieved by anchoring the corner with bent Helifix (or similar) bars in the bed joints.

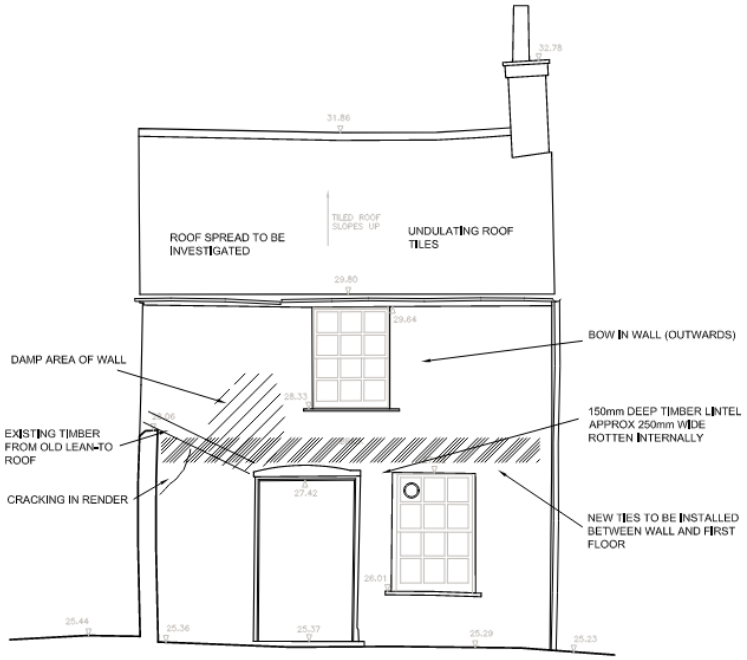

Figure 2.20 – The eastern elevation with repairs and observations

2.2.4 Southern Elevation

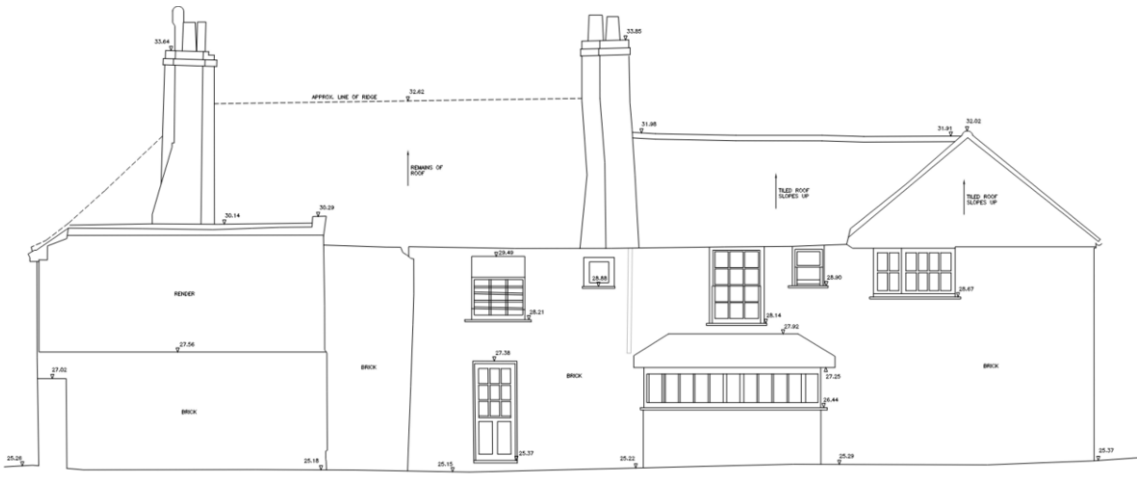

Figure 2.21 - Southern Elevation

The southern elevation encompasses various different parts of the building. The western part of the elevation (where the roof has collapsed) shows evidence of significant structural defects that pre date the fire, partly covered in 2.1.1, contributing to the collapse of the roof in this area. The render that covers the first floor has delaminated from the wall and the wall itself shows significant signs of failure including excessive lateral deflection at the head of the wall as well as down its height. At the ground floor of this western portion there is a significant crack just shy of the west corner, see Figure 2.22. The wall for this part of the elevation, full height requires to be rebuilt and the foundations to this wall exposed and assessed for their suitability.

Figure 2.22 - The crack on the western corner of the southern elevation

At the opposite corner there is evidence of significant and inappropriate structural repairs in the past where a concrete column has been formed where there once was a timber column. It appears that original timber framing at ground floor level along this elevation has either been removed or is deeply embedded within an impermeable modern wall.

The next part of the southern elevation is the staircase that forms the return between the original house and the eastern wing and is a latter intervention to the building. This section of the building shows signs of significant structural failure with a large lean outwards from the original construction as the level ascends. This lean has also resulted in the debonding of the masonry between this stairwell and the original wall at higher level, see Figure 2.23. This portion of the building is to be taken down and rebuilt, with the foundations assessed for suitability prior to the walls being rebuilt.

Figure 2.23 - The stair extension displaying structural failure

The eastern wing of the southern elevation has a bay window where the window structure is pulling away from the main building and will require to be replaced.

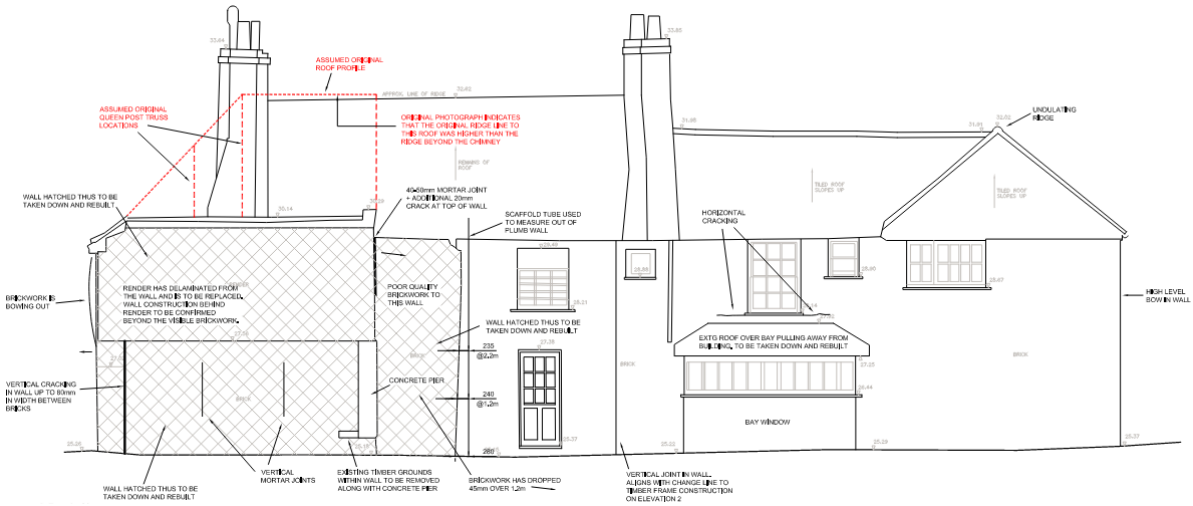

Figure 2.24 - The observations and repairs to the southern elevation

2.3 Internal Areas

2.3.1 Ground Floor - Southern Portion

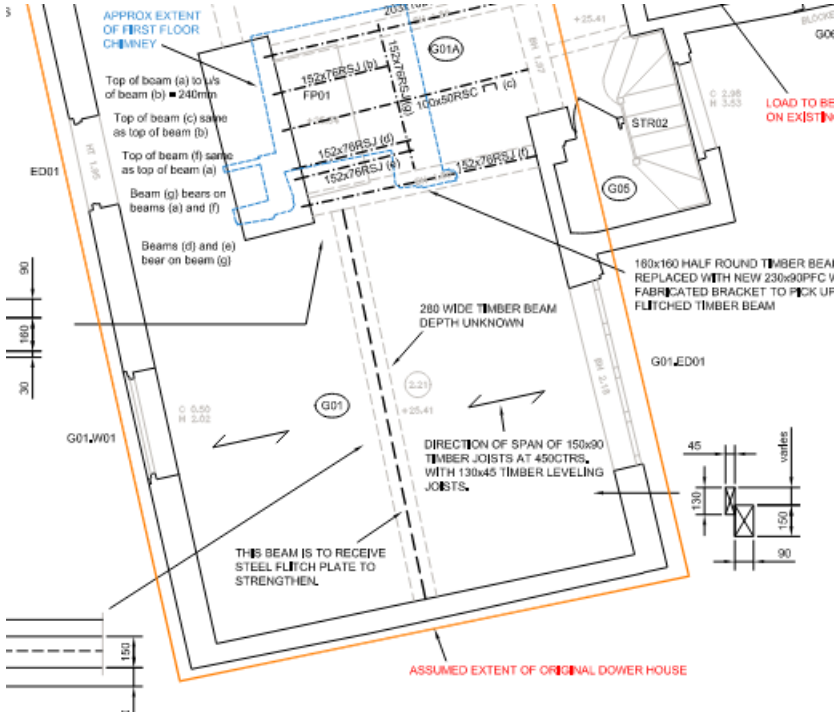

Figure 2.25 - Southern Portion of Dower House Ground Floor

The southern portion to the ground floor at the Dower House has a timber floor above with a beam that spans north to south in the middle of the room which bears on the southern gable wall and onto a timber half round beam, supporting floor joists that span

east to west. This beam may need to be strengthened as it shows evidence of sagging, for which we would propose the use of a steel flitch plate in order to retain the maximum amount of original fabric. The timber beam at the chimney end of this beam appears to be under strength and we would propose the use of a steel channel section to support the end of the original timber floor beam.

The current fireplace arrangement is a modern intervention and current proposals recommend its removal. The chimney breast above is supported by a number of steel beams within the floor space. It would be too complex and potentially damaging to reverse this so it is recommended to retain the steel supports whilst a new chimney breast is built to reflect what is believed to be similar to the original, off a 200mm thick reinforced concrete slab.

The modern intervention that contains the stair between this portion of the building and the east wing, as displayed in section 2.2.4, shows significant evidence of failure and is to be rebuilt entirely. This shown be founded on footings 600mm wide and 900 deep, stepped or tapered to suit the existing adjoining footing.

2.3.2 Ground Floor - Northern Portion

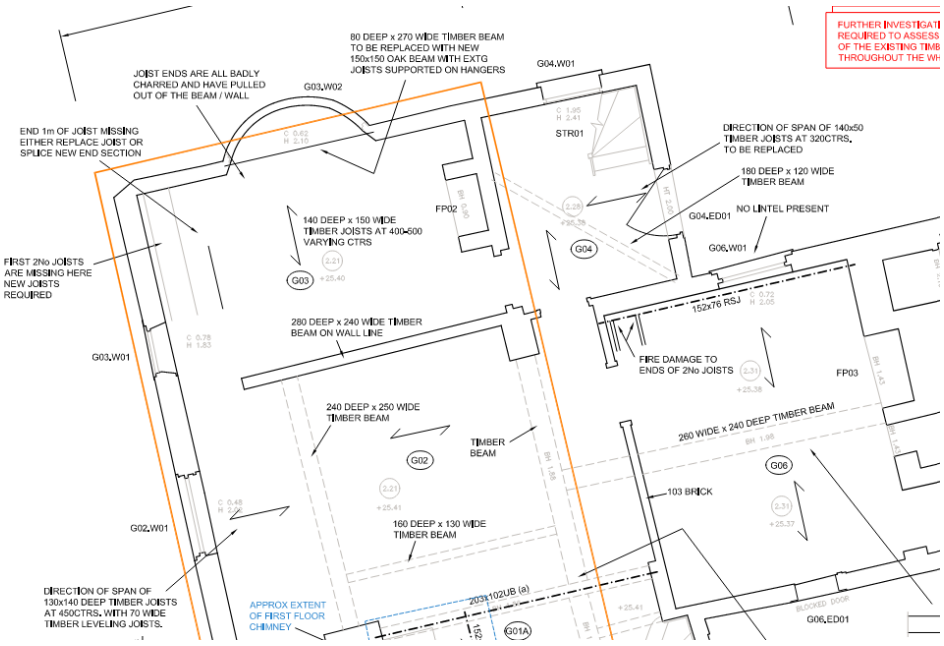

Figure 2.26 - The northern part of the original house and part east wing

The first floor structure to the northern part of the original house shows signs of fire damage, with some joists with charred/missing ends and some joists missing entirely. These are to be replaced where missing or spliced with new ends if possible where the ends are charred or damaged, alternatively, replaced entirely.

Figure 2.27 - Charred joists to the north end propped up

The existing beam over the bay window on the northern elevation is to be replaced and joists which it supports are to be on hangers.

2.3.3 Ground Floor - East Wing

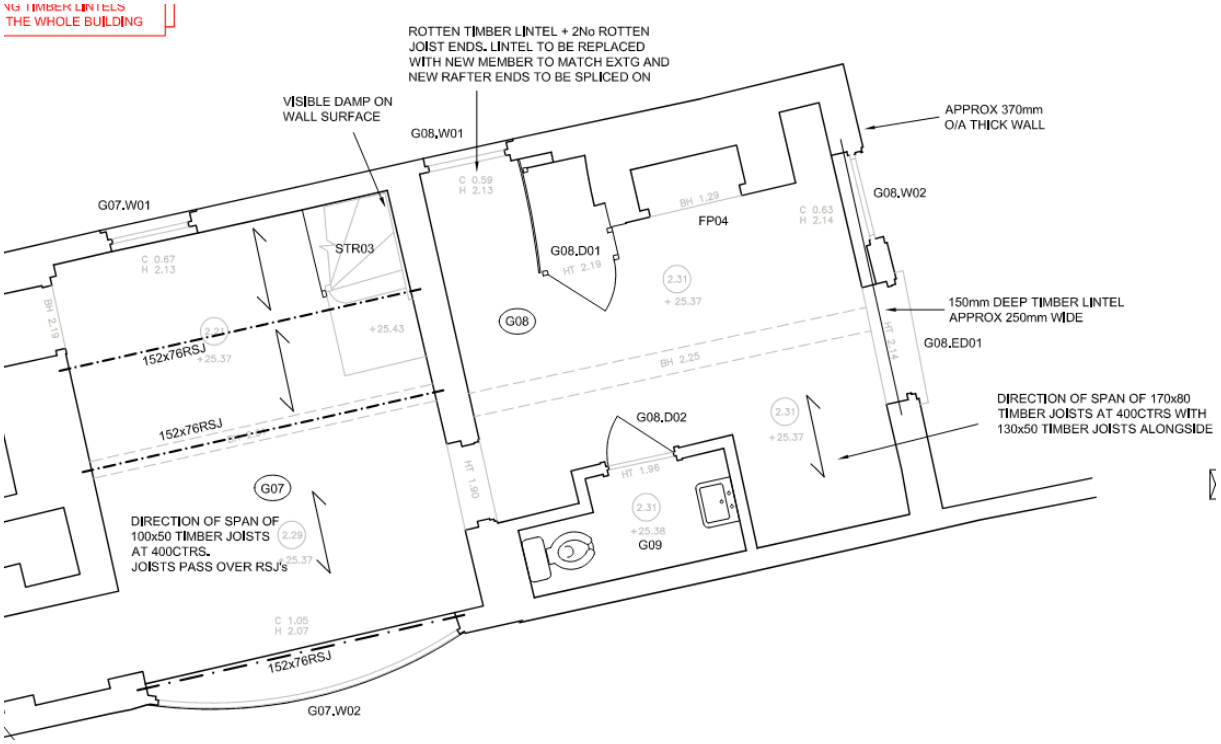

Figure 2.28 – East Wing

The walls to part of the east wing show evidence of damp and allowance must be made for joist replacement and joist end replacement due to rot and moisture damage. This

continues into the easternmost room where this rot has reached the lintel over the northern door.

The lintel over the eastern openings into the garden has structurally failed and requires full replacement, see Figure 2.29.

Figure 2.29 - Failed lintel to eastern doorway

2.3.4 Ground Floor Structure

The structure of the ground floor is currently mixed, with the original house being a suspended timber floor and the eastern wing a concrete slab. The condition of both floor constructions is very poor and requires replacement, with two options being considered:

- Limecrete slab throughout.
- Limecrete slab in original building and reinforced concrete slab in the eastern wing.

2.3.5 First Floor

The access to the first floor has been very limited on the surveys that have been carried out to date for safety reasons, so the observations and conclusions are not comprehensive and further items may be identified at a later stage.

The fire has exposed some of the original structure which would have formed the external timber framed wall to the original house but then latterly was internal, abutted but the eastern wing and possibly covered, see Figure 2.30.

Figure 2.30 - Original timber frame at first floor

The timber elements for this wall should be assessed for suitability for repair by specialist and replaced where necessary.

The ceiling joists over the first floor of the original house of the first are to be with replaced with new softwood rafters and the central beams that span between the roof trusses retained as much as possible (or replaced), supporting the joists.

The first floor of the eastern wing was inaccessible for the surveys.

3. SUMMARY OF REPAIR STRATEGY

3.1 General

The structural repair strategy is to follow the principles set out below:

1. Do Nothing

This is the ultimate outcome but can often create the most difficult of choices. It might mean accepting a wall that is leaning, a floor beam that is deflecting or a foundation that seasonally moves.

2. Add Extra Members in Similar Material

New strength by addition is preferred. A fire damaged or decayed timber joist can often be left in place with a new one added alongside.

3. Add Extra Members in Foreign Materials

Sometimes adding a similar material does not provide the required strength or involves the removal of too much historic fabric. A traditional timber splice end repair to a beam, would require the removal of more historic timber than the addition of steel plates.

4. Traditional Repairs

Traditional repairs that remove more historic fabric might be preferable in certain environments, for example exposed timber frames, where visual quality is important.

5. Insert New Materials into Existing Materials

This can be particularly useful when repairs are essential but need to remain invisible to protect the historic character of an element. An example would be the use of a steel flitch plate to strengthen an ailing beam, which is being applied to one beam at first floor level.

6. Replace Isolated Members

This can be an excellent visual solution but disruptive. Sometimes rot, failure or excessive distortion will dictate this approach. This approach has to be used to replace timber trusses irreparably damaged by the fire.

7. Replace Whole Elements of the Structure

This would be a last resort for an element that is beyond repair. It is occasionally the only way. The extent of both fire damage and previous structural failures makes it inevitable that some elements, for example, the walls to the southwest corner of the building, will require replacement. This has been kept to a minimum.

3.2 Roof

Roof Area	Repairs Required
Area 1	• 3No new green oak queen post trusses to replace collapsed roof structure. • Softwood common rafters and ceiling joists.
Area 2	• Flat roof to be rebuilt using softwood roof joists/rafters as part of failed extension rebuild.
Area 3	• Top of rafters to queen post truss to be replaced with 3 year dried seasoned oak, size to match existing. • The eastern truss bearing is to be investigated. • Western purlin o be replaced in similar size green oak, southern support to this to be investigated and assessed for suitability. • Common rafters and ceiling joists to be replaced with softwood, like-for-like.
Area 4	• Top of rafters to queen post truss to be replaced with 3 year dried seasoned oak, size to match existing. • The eastern bearing to the central truss is to be investigated. • The ties to the northern gable to be replace by timber stud frame construction. • Common rafters and ceiling joists to be replaced with softwood, like-for-like.
Area 5	• Common rafters to be replaced with softwood, like-for-like.
Area 6	• Roof Trusses to be replaced by new like-for-like green oak trusses. • Common rafters and ceiling joists to be replaced with softwood, like-for-like.
Area 7	• The brickwork gable wall will need repointing in NHL 3 lime mortar and the top 4 courses rebuilt in NHL 5 mortar with local brick replacement where necessary. • Further investigation required when access is possible.
Area 8	• Further investigation required when access is possible.
Chimneys	• Repointing in NHL 3 mortar and local repairs required to brickwork. Top 4 courses to be rebuilt in NHL 5 mortar.

3.3 External Elevations

Elevation	Repairs Required
West	• Southern portion of the elevation to be taken down and rebuilt due to structural failure. Assessment to be made of existing foundation for suitability and replaced in necessary. • Local repointing required to northern end in NHL 3 lime mortar. • Local bed joint reinforcement (Helifix bars or similar) repairs at cracking locations. • Stitching required at northern corner to north gable, see below.
North	• Western corner to be stitched back to western elevation using Cintec sock anchors, allow for 7No 1.0m long. • First floor and gable wall of original building and first floor western part of extension wing to be rebuilt in timber frame (Drawings in appendix B for clarity). • Downpipe to be replaced, vegetation removed and brickwork consolidated by local replacement and repointing. • Lintel replaced to ground floor window at eastern end.
South	• The walls to the western end (original building) of the south elevation are to be taken down and rebuilt due to failure. Foundations to be assessed for suitability and replaced if necessary. • The walls to the staircase extension are to be taken down and rebuilt due to failure. Foundations to be assessed for suitability and replaced if necessary. • Cracking in brickwork above bay wind to be addressed using Helifix bars in bed joints where the cracking has occurred. • Bay window to eastern wing to be taken down and rebuilt.
East	• Brickwork to be rebuilt to side of first floor window, keyed in with adjacent masonry and Helifix bar bed joint reinforcement. • Cracks at southern corner to be tied using Helifix bar bed joint reinforcement to southern elevation and repointed. • Wall to be tied back using ties into the first floor. • Lintel over ground floor openings to be replaced with like-for-like. • Damp area of brickwork to be consolidated with local replacement where necessary and repointing.

3.4 Internal Areas

Elevation	Repairs Required
Ground Floor – southern area	• Existing modern fireplace to be taken down and rebuilt up to underside of existing steels in first floor off new 200mm thick reinforced concrete slab. • Existing steels to be wire brushed and painted. • Half round timber beam to be replaced with 230x90 PFC. • Central Timber first floor beam to be strengthened with steel flitch plate and joists to connect using steel angle where necessary. • Stairwell extension to be taken down and rebuilt.
Ground Floor – northern area	• Timber beam over bay window to be replaced with new 150x150 oak beam with joists supported on hangers. • Some joists to be replaced, some joist end replacement and existing joist ends to be supported off new beam.
Ground Floor – eastern wing	• Timber floor joists to be replaced in northern portion. • Damp visible to first floor joists, allow for 30% joist end replacement. • Failed timber lintel over eastern external doorway to be replaced
Ground Floor	• Ground floor structure to be replace throughout. Two options considered: o Limecrete slab throughout. o Limecrete slab to original house and reinforced concrete slab to latter eastern extension.
First Floor	• Timber frame elements to original house to be assessed, restored where possible and replaced if necessary. • Ceiling joists to be replaced by new softwood joists. • Further assessments to be made when access is possible, particularly in eastern wing.

APPENDIX A
Photographs

APPENDIX B
Drawings